

Statement	T or F
A solvent like water can dissolve an unlimited amount of solute.	F
Miscible materials are substances that are mutually soluble, like H ₂ O and CH ₃ CH ₂ OH.	T
Water is a polar molecule and is a good solvent for ionic and polar solutes.	T
Temperature increases usually decrease the solubility of a solid substance in water.	F
Gas solubility in water decreases when the temperature goes up.	T
When the pressure of a gas over water is raised, the gas solubility increases.	T
An unsaturated solution can dissolve more solute.	T
Nonpolar substances do not dissolve well in water.	T
Ionic substances dissolve to form electrically conducting solutions.	T
There is no such thing as a "supersaturated" solution.	F
According to the solubility graph, ≈ 79 g NaNO ₃ will dissolve in 100 mL of water at 10°C.	T
100 mL of KCl solution at 50 °C has 10 grams. This solution is saturated.	T
Hydronium ions are hydrated hydrogen ions.	T
For nonelectrolytes, the complete molecule goes into solution.	T
The ions in a solution that do not make up the precipitate are <i>spectator ions</i> .	T
A nonpolar solvent will dissolve a polar solute.	F
Dissociation is the separation of ions that occurs when ionic compounds dissolve in water.	T
Stirring the solution will help to increase the rate at which a solid will dissolve in a liquid	T
Powdering the solid will not help to increase the rate at which a solid will dissolve in a liquid.	F
Heating the solvent will help to increase the rate at which a solid will dissolve in a liquid	T
Pressure has very little effect on liquid/liquid solutions.	T

Pressure has very little effect on solid/liquid solutions.	T
Gas/liquid solutions respond very easily to changes in pressure.	T
Concentrated means a large amount of solute in the solution	T
Solubility is the maximum amount of solute that can dissolve in a given amount of solvent under certain conditions.	T
Non-polar solute molecules will dissolve in non-polar solvents.	T
An aerosol is a colloid of fine solid particles or liquid droplets in a gas such as clouds.	T
Foam is a substance that is formed by trapping pockets of gas in a liquid or solid.	T
A beam of light or laser light will not trace a visible path through a true solution	T
A general rule applied to solute-solvent relationships goes like this: " Like dissolves like"	T
Water is the universal solvent.	T
The solubility of a gas decreases as the temperature of the solvent increases.	T
Temperature has no affect on solubility in liquid/liquid solutions.	T
When a solute is dissolved into a solvent, the boiling point of the solvent is raised.	T
Bp and fp changes are directly proportional to the molar concentration.	F
The addition of a solute to water will lower the freezing point below 0° C.	T

Problems:

- How many grams of NaCl will dissolve in 300 mL of water at 45 °C?

$$\frac{38 \text{ g}}{100 \text{ mL}} = \frac{x \text{ g}}{300 \text{ mL}} \quad x=114 \text{ g}$$

- How many grams of CsCl will precipitate out of solution if the solution is cooled from 35°C to 10°C? **more than 20 grams.**

- What is the molality of a solution that has 7 moles of KCl in 2100 g of water?

$$m = \frac{7 \text{ mol}}{2.1 \text{ kg}} = 3.3 \text{ m}$$

4. How many grams of NaOH are needed to make a 1.5 m solution with 1600 grams of water?

$$1.5 \text{ m} = \frac{\left(\frac{x \text{ g}}{40 \text{ g}} \right)}{1.6 \text{ kg}} = 96 \text{ g}$$

5. What is the molarity of a solution that has 5 moles of LiCl in 3500 mL of solution?

$$M = \frac{5 \text{ mol}}{3.5 \text{ L}} = 1.43 \text{ M}$$

6. How many grams of KI are needed to make 1200 mL of 1.5 M solution?

$$1.5 \text{ M} = \frac{\left(\frac{x \text{ g}}{166 \text{ g}} \right)}{1.2 \text{ kg}} = 298.8 \text{ g KI}$$

7. How many grams of solute are in 1500 grams of a 7.50% solution?

$$7.50 \% = \frac{x \text{ g}}{1500 \text{ g}} \times 100\% = 112.5 \text{ g}$$

8. What is the boiling point of a 0.45 molal solution of H_3PO_4 ?

$$\Delta T_b = (0.45 \text{ m}) \left(\frac{0.521^\circ \text{C}}{1 \text{ m}} \right) (4) = 0.94^\circ \text{C} \quad \text{new bp} = 100.0^\circ \text{C} + 0.94^\circ \text{C} = 100.94^\circ \text{C}$$

9. Calculate the molecular weight of butyl alcohol, 18.5 grams of which dissolves in 750 grams of water to produce a solution having a freezing point of -0.62°C

$$0.62^\circ \text{C} = \left(\frac{\left(\frac{18.5 \text{ g}}{x \text{ g}} \right)}{.75 \text{ kg}} \right) \left(\frac{1.86^\circ \text{C}}{1 \text{ m}} \right) (1)$$

$$0.33 \text{ m} = \left(\frac{\left(\frac{18.5 \text{ g}}{x \text{ g}} \right)}{.75 \text{ kg}} \right)$$

$$0.25 \text{ mol} = \frac{18.5 \text{ g}}{x \text{ g}}$$

$$x \text{ g} = \frac{18.5 \text{ g}}{0.25} = 74 \text{ g/mol}$$